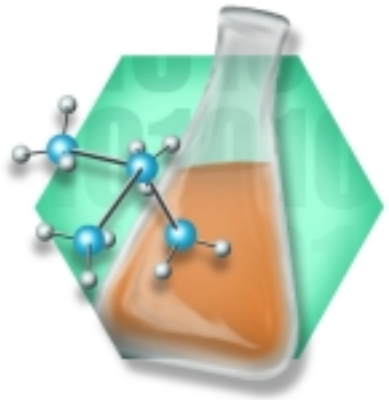
OPERATIONAL CONCEPT DESCRIPTION (OCD)
VERSION: DRAFT



CHEMICAL INFORMATION MANAGEMENT SYSTEM (CIMS)
VERSION: ALPHA

PREPARED FOR:
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)
ENVIRONMENTAL COMPLIANCE & SAFETY (ECS) STAFF
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21 MAY 1999

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GSA MOBIS DELIVERY ORDER
UNDER PRIME CONTRACT: GS23F9787H

Change Status

Date	Description of Update
05/21/99	Draft Delivered to Veridian SEMG
05/24/99	Draft Delivered to NOAA ECS for Review

Table of Contents

1. INTRODUCTION

Under prime contract GS-23F-9787H, General Service Administration's Management, Organizational, and Business Improvement Services (MOBIS) schedule, Veridian Engineering, an operational group of Veridian Corporation, has been selected to provide information technology (IT) services and software life cycle support defined in detail below.

1.1 Identification

The Chemical Information Management System (CIMS) is being developed to provide the National Oceanic and Atmospheric Administration (NOAA) of the U.S Department of Commerce and its staff an automated information management system in support of outstanding operational shortfalls/requirements. NOAA's Environmental Compliance and Safety (ECS) staff, in close coordination with the CIMS user group, has identified a list of Phase I requirements that have been designated as "Mandatory" in order to achieve a higher level of environmental compliance.

NOAA has identified contractual requirements for technical and software engineering support in the tailored design and development of CIMS. NOAA's ECS staff, in close coordination with the operational community, has defined a multi-phased program prioritizing operational requirements and providing increased functionality with each build. As proposed, the Phase I CIMS application will provide the ECS and user community with a dynamic software tool to facilitate and manage chemical inventories in compliance with federal and state regulations. For the remainder of this document, reference to CIMS application software will apply to the following configuration:

Chemical Information Management System
Software Version: Alpha

CIMS will provide a well defined and structured process to reduce factors of time, effort, and cost incurred under current operations. In addition, a fully integrated and employed CIMS application will increase measures of compliance with applicable state and federal regulations governing the management, storage, disposal, labeling, and reporting requirements imposed on hazardous chemicals. The centralized CIMS architecture will provide rapid access and dissemination of decision support information across participating facilities and all authorized users, thereby reducing the risk of delays associated with alternate configuration management approaches. The CIMS project will be performed in close coordination with the CIMS user community. Periodic interface will be accomplished through Veridian participation in the CIMS user group.

1.2 Scope

The purpose of this Concept of Operations Document is to describe the Chemical Information Management System, why it is being developed, and its relationship with NOAA and the ECS Program's missions and goals. This document will describe current and proposed chemical tracking methods.

2. APPLICABLE DOCUMENTS

The Environmental Compliance Act (ECA) web-site will provide the media for access to CIMS project-related documentation and files. By design, the web-site will contain information on CIMS architecture analysis and a number of requirements documents prepared prior to Veridian's involvement. In addition to the information contained within the ECA web-site, the following list of applicable documents has been identified for the CIMS project:

- GSA MOBIS Contract, Statement of Work (SOW), Dated 1 March 1999
- NOAA ECS, CIMS Phase I Requirements, Revision 3, Dated 12 March 1999
- Veridian Corporation, Applied Technology Group, Software Engineering Management Plan (SEMP), Dated October 1998
- Veridian Corporation, Applied Technology Group, Draft CIMS Software Development Plan (SDP), Dated 1 May 1999
- Veridian Corporation, Applied Technology Group, Draft CIMS Software Requirements Specification (SRS), Dated 24 May 1999

3. BACKGROUND

The Environmental Compliance Enterprise Architecture (ECEA) has been established to provide a framework for guiding the design and implementation of an integrated open system architecture supporting a wide range of NOAA ECS functional and operational requirements. To help ensure environmental compliance and facilitate pollution prevention, the ECS created the CIMS initiative. Specifically, the CIMS mission statement is to develop an integrated chemical management system to ensure the safety of employees, protection of the environment, and compliance with environmental regulations governing the management of hazardous materials. Under the current architecture, each operational facility is required to develop independent processes and procedures to ensure compliance with environmental laws and regulations resulting in redundant efforts with little to no consistency between facilities. Furthermore, the cost and resource requirements for developing site specific systems have compromised their effectiveness resulting in internal audit findings, notices of violation by regulatory agencies, and fines.

The CIMS functional and operational requirements are derived from numerous sources including regulatory policy, historical CIMS documentation, CIMS development team discussions, and User Group interaction. The derived CIMS objectives are:

- Facilitate environmental compliance by increasing awareness of issues related to the handling of hazardous chemicals and by tracking facility compliance;
- Provide more consistent level of chemical inventory tracking than current approaches allow;
- Achieve a higher level of environmental regulatory performance than is currently possible;
- Maximize economies of scale by avoiding costs incurred through duplication of efforts;
- Avoid unnecessary costs by reducing or eliminating the potential for fines associated with environmental noncompliance; and
- Tailor efforts to the needs of line offices

3.1 Operational Policies

3.1.1 ECS Mission

The Environmental Compliance & Safety Program was created by NOAA to address environmental issues throughout the agency. NOAA's ECS mission is to ensure that the Agency conducts their activities in an environmentally responsible manner by meeting three goals:

- Restore contaminated properties caused by NOAA
- Ensure environmental compliance through pollution prevention; and
- Sustain environmental compliance through an environmental management system.

3.1.2 CIMS Mission

Critical elements in meeting the CIMS mission are worker's safety, protecting the environment, and complying with environmental regulations governing the management of hazardous materials. CIMS will assist facilities in meeting these three goals.

3.2 Description of Current System

Currently, each NOAA facility has its own method of chemical inventory to ensure compliance with environmental laws and regulations. Users at the NOAA/CIMS User Group Meeting on April 20-22, 1999 described these methods.

3.2.1 Chemical Inventory

Several facilities use the "clipboard method" of doing inventory by hand, while other facilities use their own computer spreadsheets (i.e. Microsoft Excel) to manage their chemicals. These computer systems only keep track of the types, numbers, and quantities of chemical containers stored at that particular facility. Facilities are only able to see their own data, with no method of sharing between locations. This decentralized approach hinders a staff member from one facility borrowing a chemical from a nearby facility. The result is a duplication of chemical ordering, resulting in duplication of effort and increased cost.

Facilities update their inventory by using a hard copy of the previous year's inventory and manually entering the updated information. This tracking method can lead to simple mistakes. Because there is no consistency between facilities, these current methods of inventory control cost time and money, resulting in negative internal audit findings, notices of violation by regulatory agencies, and fines.

3.2.2 Material Safety Data Sheet

The manufacturer or distributor is required to send a Material Safety Data Sheet (MSDS) with each chemical shipment. Typically, the MSDS is stored at the work site as a hard copy in the MSDS binder. Some facilities don't have an updated MSDS, which can lead to a fine for OSHA non-compliance. If an MSDS is missing the facility must contact the manufacturer and request a replacement MSDS.

3.2.3 Waste Tracking

Federal and State regulations require strict time and quantity limits regarding the handling and storage of hazardous chemicals and waste. Current processes to track the shelf life, waste quantities, and locations are largely accomplished through manual procedures. This has led to waste being kept on site longer than allowed and inaccurate waste information. In addition, facilities have been fined when auditing procedures uncover violations due to insufficient practices.

4. JUSTIFICATION FOR CHANGES

The CIMS initiative was created to ensure NOAA facilities meet environmental compliance regulations governing the handling of all chemicals and hazardous materials.

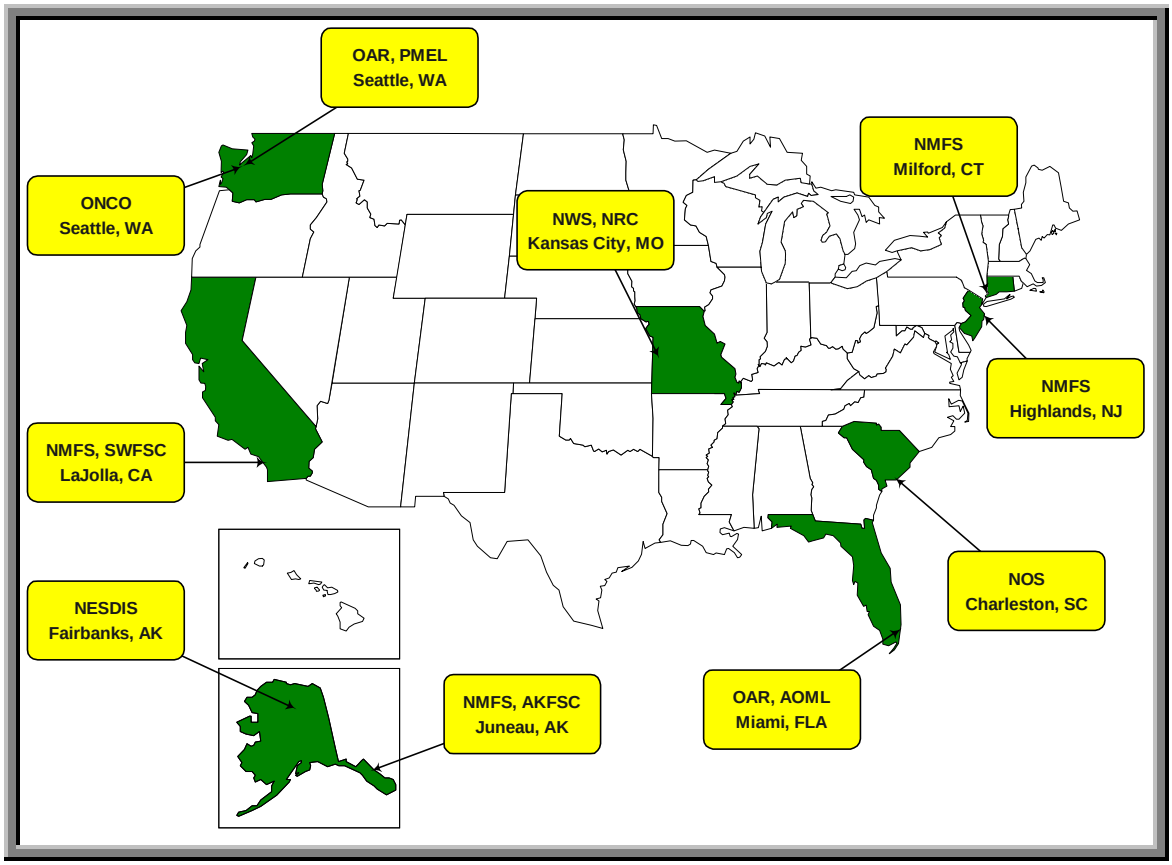
4.1 Description of Changes

The NOAA organization, specifically the CIMS User Group which consists of line/staff office representatives and regional compliance officers (RECO's), has identified a list of four mandatory functional requirements to be incorporated into the first phase of a three phased development process. These requirements represent high level CIMS. Phase I requirements, as defined by the CIMS User Group, are:

1. Chemical/Container Tracking
2. Access to Material Safety Data Sheets (MSDS)
3. Chemical Container Warning Label Generation
4. Generating Specialized Reports

These requirements for CIMS must meet both external regulatory requirements, and internal requirements such as ECS and CIMS mission. Ten NOAA pilot facilities have been identified that will participate in the implementation of the Phase I CIMS functionality (See Figure 4.1). Phases II and III will add additional functionality and NOAA facilities leading to a nationwide CIMS operational capability. Each Phase will be fully tested and implemented operationally before the next build is implemented.

Figure 4.1 CIMS Pilot Test Facility Map



4.2 Assumptions and Constraints

CIMS Phase I application software must provide the dynamic ability to support near real-time management of chemical inventories within the ten pilot NOAA ECS facilities. Success for the CIMS application will be heavily influenced by its acceptance within the user community. While CIMS provides the software and database architecture to facilitate critical information and provide dynamic query tools, it is the responsibility of the user to populate data specific to their facility and ensure inventory transactions are recorded in a timely manner. Limited use and/or commitment by the user community could result in the dissemination of errant information, which could be worse than no data at all.

5. NEW SYSTEM CONCEPT

5.1 Background

Once the CIMS application has been developed and deployed, NOAA's facilities will have the ability to track chemical inventory, access MSDS sheets electronically, produce labels, and generate reports by computer. When a chemical is received at a facility, the user must input specific container data, such as the name, amount, and date received. The user must also verify whether or not an MSDS exists for the chemical.

The CIMS application will centrally store all NOAA facility chemical information that will track the types, numbers, and quantities of chemicals stored at each facility. In addition, CIMS will maintain specific information on the chemical, such as reactivity, physical state, and chemical type. CIMS data is centralized, therefore staff members will be able to access information about other facilities, such as their chemical inventory. This will help to facilitate the sharing of chemicals between facilities.

MSDSs will be stored electronically or by a World Wide Web hyperlink to the manufacturer's site. "Hard Copies" should be printed as a back up for quick retrieval or lack of Internet access. If an MSDS must be replaced or updated, the database will contain information, such as the manufacturer's name and chemical synonym.

CIMS will have the capability to print required labels. If a staff member switches containers or creates a "recipe", CIMS can produce the label required for the secondary container.

5.2 Operational Policies and Constraints

NOAA's facilities must comply with several environmental regulations. The regulations that CIMS will address include Occupational Safety & Health Association (OSHA) requirements, the Resource Conservation and Recovery Act (RCRA), and requirements specified by Department of Transportation (DOT) policies. Listed below are the specific regulations that CIMS, ECS staff, and NOAA must follow.

5.2.1 Occupational Safety & Health Association Requirements

Under OSHA regulations (29 CFR 1910.1200 et seq.), NOAA facilities must comply with requirements under the Hazard Communication Standard (HCS) and, in the case of laboratories, develop and implement chemical hygiene plans (CHP). Requirements of the HCS and CHP that apply to NOAA facilities and CIMS include:

- Maintaining an MSDS for each hazardous chemicals kept on-site
- Maintaining labels and appropriate hazard warnings on containers
- Ensuring safe storage of hazardous chemicals and ensuring that incompatible chemicals are not stored in close proximity
- Ensuring bottle and shelf-life expiration dates are not exceeded

5.2.2 Resource Conservation & Recovery Act Requirements

The Resource Conservation & Recovery Act (RCRA) requires generators of hazardous waste to handle and dispose of the wastes in an appropriate manner. Requirements of the RCRA that apply to NOAA facilities and CIMS include:

- Tracking containers that hold hazardous waste
- Maintaining chemical labels consistent with specific labeling requirements including:
    1. All containers that hold hazardous waste must be labeled "HAZARDOUS WASTE"
    2. All containers must also be labeled with the start date of accumulation
- Generating hazardous chemical reports at Headquarters, Administrative Support Center, and facility levels

5.2.3 Department of Transportation Requirements

Under RCRA regulations, specific packaging and labeling requirements refer to DOT requirements for the transport of hazardous materials. These include:

- Generating appropriate DOT warning labels for containers that hold hazardous materials in preparation for off-site transportation

5.3 Description of New System

The CIMS Application consists of a Three-Tier web based architecture with an Oracle Relational Database Management System (RDBMS) as the backend database engine. The CIMS application will provide the user with a web-based suite of user friendly tools and applications to identify/select their search criteria, execute the query, and report the results. Quick links to reference documentation, information, and material will further enhance the CIMS utility. This web-based architecture will ensure database updates are executed at the application server and instantly disseminated to all CIMS users. The CIMS application connection will be provided via the Internet or remote "dial-in." The graphical user interface design will utilize Hyper-Text Markup Language (HTML), JavaScript, and compiled Program Language/Structured Query Language (PL/SQL) code.

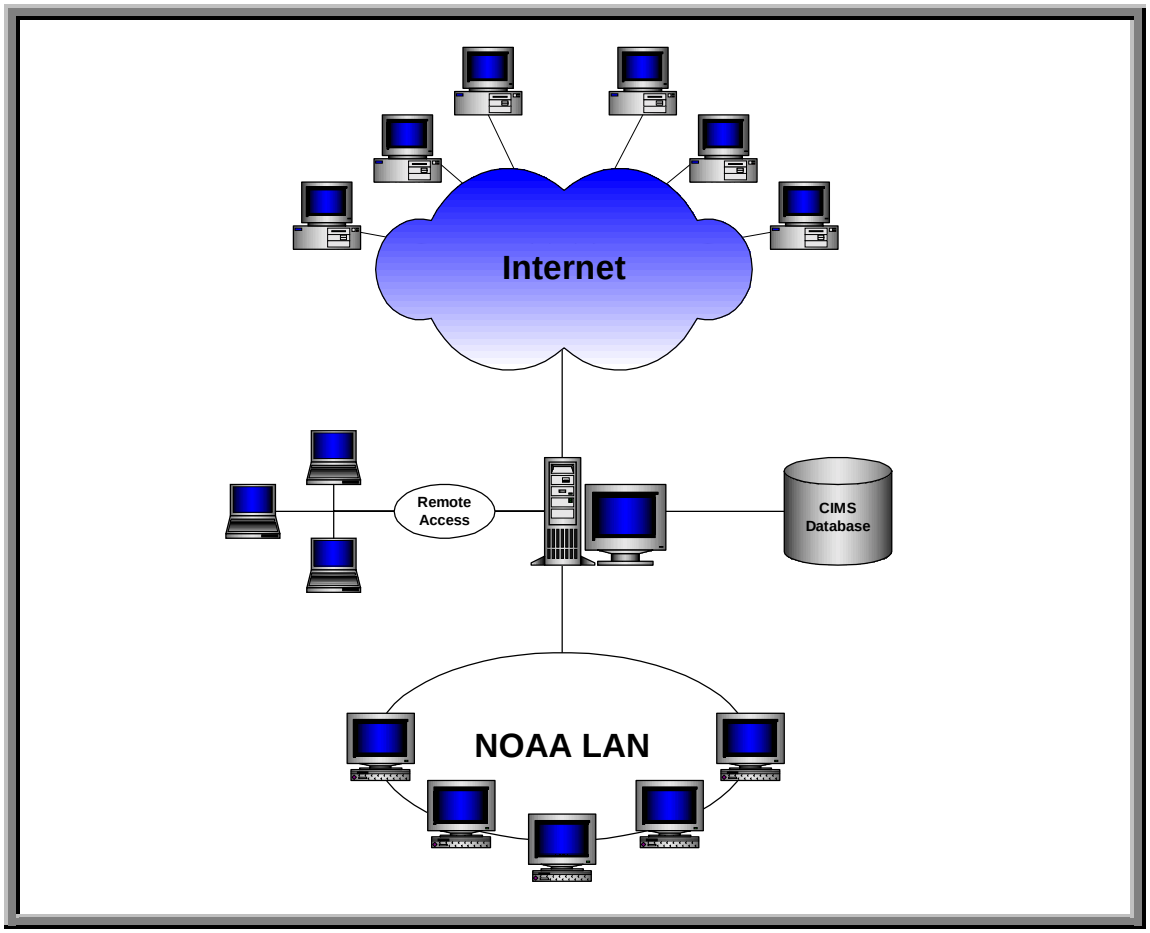


Figure 5-1. CIMS 3-Tiered Architecture

5.4 Chemical Information Management System Processes

The following section describes the processes that a user will follow while using the CIMS Phase I configuration. These processes were specified by the CIMS User Group and include:

- Transactions -Work activities involved in completing the CIMS processes
- Data fields - Information that must be populated to perform such activities

Once the chemical is entered into inventory the user may perform other transactions. These transactions are defined as:

Receive:	The container, with stored chemical, enters the facility and the user enters it into the inventory.
Add:	Used for the creation of recipes and separating contents of one container into two separate containers.
Move:	The container has been relocated within the facility, and moved to another storage area.
Transfer:	Indicates that the container is being moved to another facility and therefore, has left inventory.
Reconcile:	This is used to "balance the books" by having the database verify an audit of the physical inventory.
Use:	Draw down a portion of the chemical. This will result in an inventory decrease.

5.4.1 Chemical Inventory Tracking

Users will be able to access, record, modify, and report information relating to receiving, transfer, and handling of containers of chemicals, recipes and waste. There are two parts to the CIMS Chemical Inventory Tracking: Chemical Library and Container Inventory. The Chemical Library contains information about the chemicals, recipes and waste. The Container Tracking portion tracks container attributes and is linked to an existing or user-defined chemical in the Chemical Library. Once a container enters a facility, CIMS is utilized to track the container until disposal as waste or removal from inventory.

5.4.1.1 Chemical Library

The chemical library will contain detailed chemical information, which is required to allow for regulatory tracking and reporting**.** It will aid authorized users in tracking information pertinent to their jobs. The Master Chemical Library application will allow users to access information relating to hazardous chemicals as well as user generated "recipes." The process for entering new chemicals is described in Appendix B – CIMS Work Flow Process: Chart B.1 covers the addition of a new chemical and Chart B.2 covers the addition of a "recipe". A minimum of the following information will be maintained in the library database:

- Chemical Name
- Alias Name(s)
- Manufacturer
- Chemical Form (Pure, Mixture, Recipe, Kit)
- Physical State (Solid, Liquid, Gas)
- Chemical Abstract Service Number (CAS)
- EPA Identification Number
- Specific Gravity of the Chemical
- Chemical Components (If Applicable), and their percentage

- EPA Hazard Category (Flammable, Sudden Release of Pressure, Reactive, etc.)
- Chemical Type (Hazardous, Non-Hazardous, Consumable)

5.4.1.2 Container Inventory

When a container is first received at a facility, the user must enter the chemical name, date received, container type and size, and its contents into CIMS. It is up to the facilities to update and maintain this information. The process for entering new containers into the inventory and transferring containers is described in Appendix B – CIMS Work Flow Process: Chart B.3 covers the addition of a new container, Chart B.4 covers the movement of a container within a facility, Chart B.5 covers the transfer of containers to another facility, Chart B.6 addition of a new recipe container. Certain users will be able to access other facilities' data that will allow for consistency between facilities. CIMS will assign tracking numbers (ie. Bar Code Number) to each container. When a chemical is first received at a facility, at a minimum, the user must enter and continue to track the following information:

- Chemical name
- Manufacturer
- Container Type
- Container Content
- Volume
- Unit of Measure
- Quantity of Containers
- Responsible Party
- Storage Location
- Date of Transaction
- Date Opened
- Shelf-life Expiration Dates

RCRA requires that generators of hazardous waste handle and dispose of the wastes in an appropriate manner. Once the chemical becomes waste, the user must track that container as a waste, and update the label and information in inventory. As required by RCRA, the user will be able to track the following additional information:

- Name of hazardous waste
- RCRA regulatory status of area where container is located (ex: satellite accumulation area)
- Date when material switched from chemical to waste, or date when waste was first placed in drum
- Handling method

5.4.2 MSDS Tracking

Phase I access to Material Safety Data Sheets will be limited to hypertext links to the manufacturer or vendor's web site, or an electronic file maintained within the CIMS hardware architecture. Users will then be able to view or print MSDS for all hazardous chemicals in inventory which contain such a link or file. The process for entering new or modifying MSDS information is described in Appendix B – CIMS Work Flow Process: Chart B.7 addition of Manufacturer/MSDS Information.

The entire user community will have the capability to choose from one or more links from a list to access the manufacturers' web site. Once they reach the web site, they must navigate themselves to bring up the MSDS information for each specific chemical. Veridian can not ensure that the user-defined links will be valid at any point in time. System integrity will be strongly influenced by the maintenance of the manufacturer/vendor's site and their data management processes as well as the status of the Internet connection. Phase II will be focused on incorporating direct links to electronic MSDS files all chemicals in inventory.

5.4.3 Chemical Label Generation

CIMS will provide a tool to produce the applicable warning label for a container that holds a hazardous chemical or waste. A sample of these labels was provided by the CIMS Software Development Plan and will be refined in the CIMS Software Requirements Specification. These labels will be printed on "Avery White Spool" labels. The process for creating labels is described in Appendix B – CIMS Work Flow Process: Chart B.8 Print Label.

The six types of warning labels that can be generated are:

- Non-regulated
- Hazardous Waste
- Chemical Storage
- Process Container/OSHA Hazard Label
- Sample Label
- Sample Container

5.4.4 Structured Reports

CIMS users will be provided a tool to generate structured reports through the CIMS application software. Some examples of reports generated include quarterly reports that list what chemicals are at specific facilities or storage area. The Report generation tool will support both web page report generation as well as creating a text file that can be saved, stored, and/or printed. User specified reports will be defined in detail after the preliminary design review is completed. Phase II and beyond will address ad hoc reporting requirements and issues.

5.5 Users/Affected Personnel

CIMS will address Password Security and Privilege Management Issues for all users. There will be a password security policy forcing users to change their passwords at regular intervals, and CIMS will establish roles to manage the privilege levels available to users. Within the CIMS schema, a single "security administrator" will be assigned with privileges to create, alter, or drop database users. A system log will be maintained to record user transactions and maintain data integrity. User access control and permissions will be allocated during the log-in sequence. Specific access levels and their functions will be defined in detail within the Software Requirements Specification (SRS). CIMS application will be accessible by those users authorized by the system administrator.

5.6 Support Concept

CIMS will provide the capability of reporting "bugs" or run-time errors. The user can document the problem on-line and submit this form to Veridian or there will be an electronic mail link to send a problem report with the user's electronic mail system.

6. OPERATIONAL SCENARIOS

6.1 Chemical Inventory Tracking

Facility A runs out of sodium hydroxide. The user at Facility A accesses CIMS to see if any other facilities/labs in close proximity have any sodium hydroxide in their chemical inventory. Facility B, one hour away has an excessive amount of sodium hydroxide. Facility A arranges to transfer some of the sodium hydroxide from Facility B to their lab, saving time and money by not ordering a new shipment of sodium hydroxide.

6.2 MSDS Tracking

At the lab at Facility A, an employee spills a quantity of formaldehyde. The MSDS is not available in the MSDS binder for that particular chemical. Their next step is to access CIMS and pull up the MSDS sheet for formaldehyde. They do this by using one of the web links to the manufacturer. After finding the MSDS for formaldehyde, the employee prints a copy and puts that copy in the MSDS binder. They review the MSDS and safely clean up the spill.

6.3 Chemical Label Generation

A Chemist at Facility C decides to split up a fifty-five gallon drum of ethanol into a thirty-five gallon container and a thirty gallon container. He needs to reproduce a secondary label for the two containers. By using CIMS labeling function, the chemist prints a secondary label for the two ethanol containers.

6.4 Structured Reports

The administrator at Facility B wants to track the amount of hazardous waste generated in the last thirty days. He is able to use CIMS and print a report stating how much of their chemicals have became waste in the past month.

7. ANALYSIS OF PROPOSED SYSTEM

The following summarizes the benefits and issues with the CIMS Application. Analysis of Proposed System

7.1 Summary of Advantages

- Reduce or eliminate fines and penalties due to environmental regulation non-compliance
- Reduce or eliminate unauthorized discharge or disposal
- Simplified labeling of hazardous chemicals
- Excellent CIMS training
- Eliminate unpermitted and unauthorized activity
- Decrease operation and maintenance failures
- Compliance with reporting requirements
- Complete forms, documents, plans, etc.
- Proper storage and accumulation of hazardous chemicals
- Proper hazardous waste treatment, storage, and disposal
- Help reduce time required to prepare reports
- Reduce health and safety related problems
- Reduce amounts of waste generated

7.2 Summary of Disadvantages/Issues

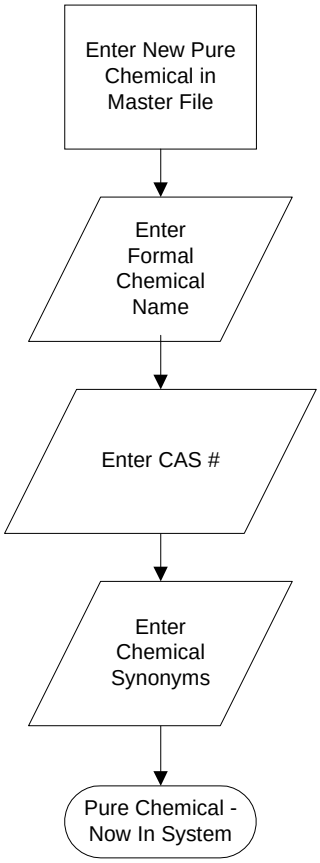
- Requires manual entry of all information
- Stagnate Chemical and MSDS information

Appendix A – Acronyms

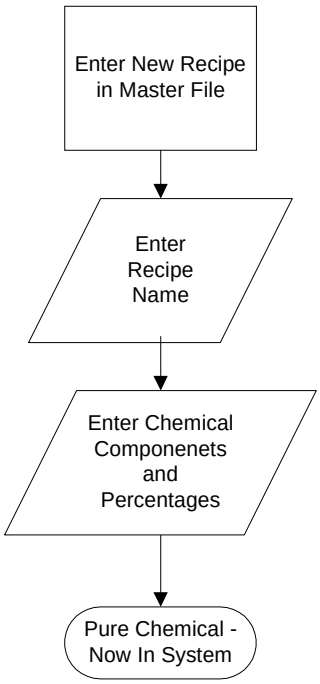
Acronym	Definition
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
CHP	Chemical Hygiene Plan
CIMS	Chemical Information Management System
DOT	Department of Transportation
ECA	Environmental Compliance Act
ECEA	Environmental Compliance Enterprise Architecture
ECS	Environmental Compliance and Safety
EPA	Environmental Protection Agency
HCS	Hazard Communication Standard
HTML	Hypertext Mark-up Language
IT	Information Technology
MOBIS	Management, Organizational, and Business Improvement Services
MSDS	Material Safety Data Sheet
NOAA	National Oceanic and Atmospheric Administration
OSHA	Occupational Safety and Health Act
PL/SQL	Program Language/Structured Query Language
RCRA	Resource Conservation and Recovery Act
RDBMS	Relational Database Management System
RECO	Regional Environmental Compliance Officer

Appendix B – CIMS Work Flow Process

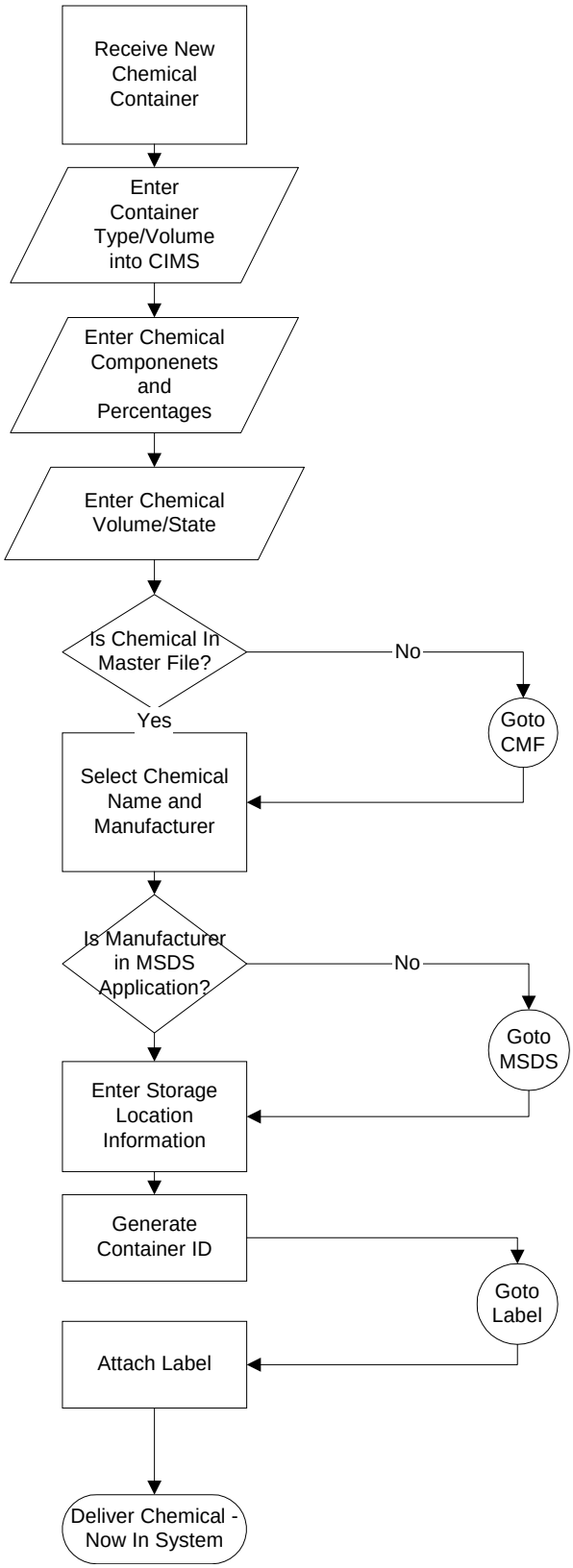
B.1 Add New Chemical to Master File



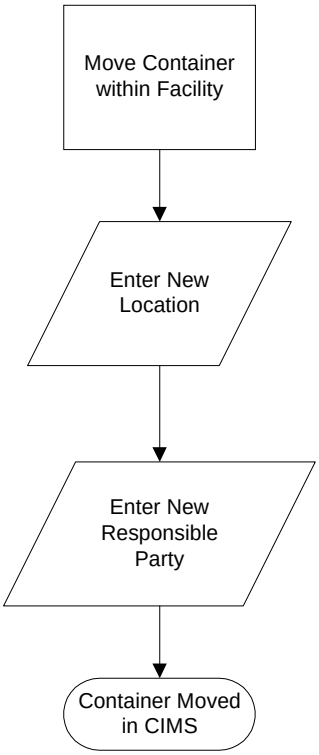
B.2 Add New Recipe to Master File



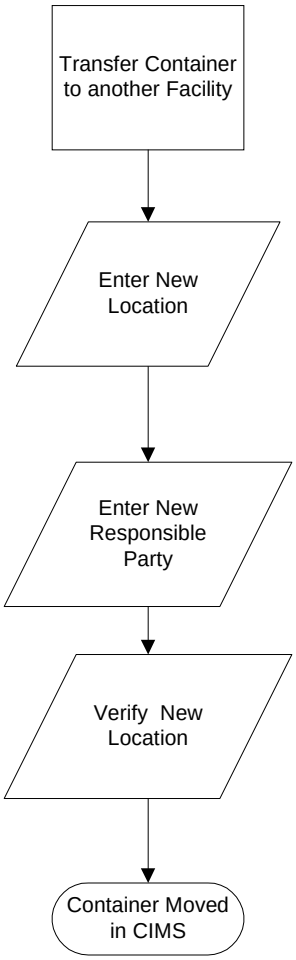
B.3 New Container Process



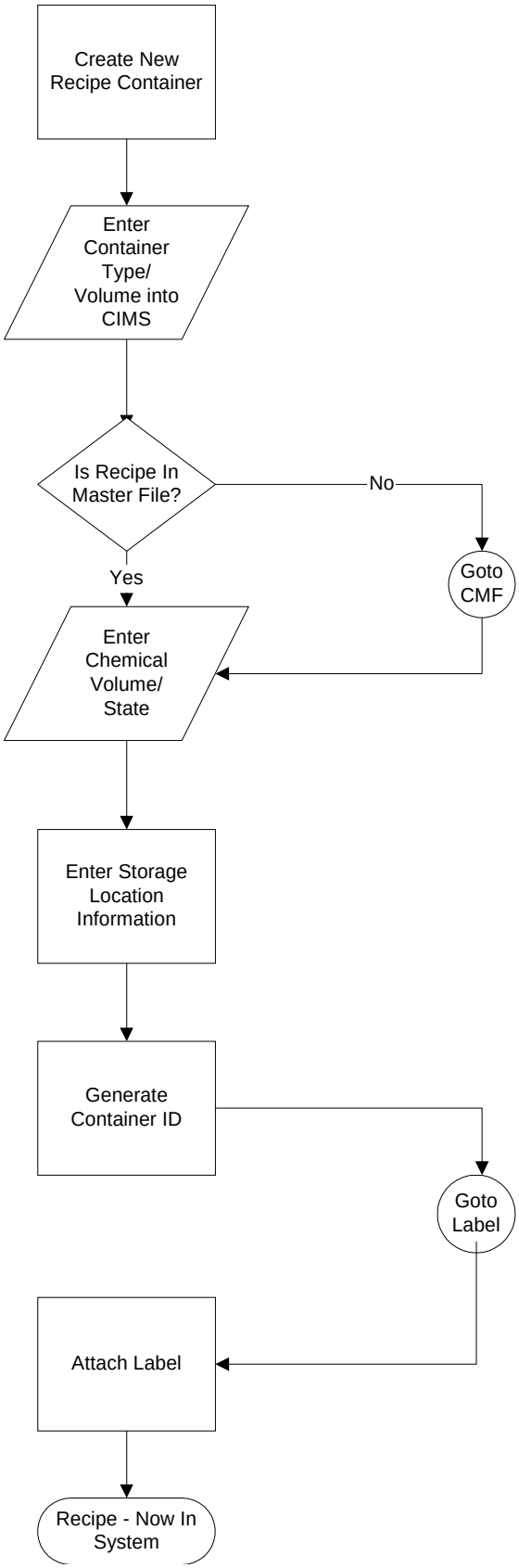
B.4 Move Container within Facility



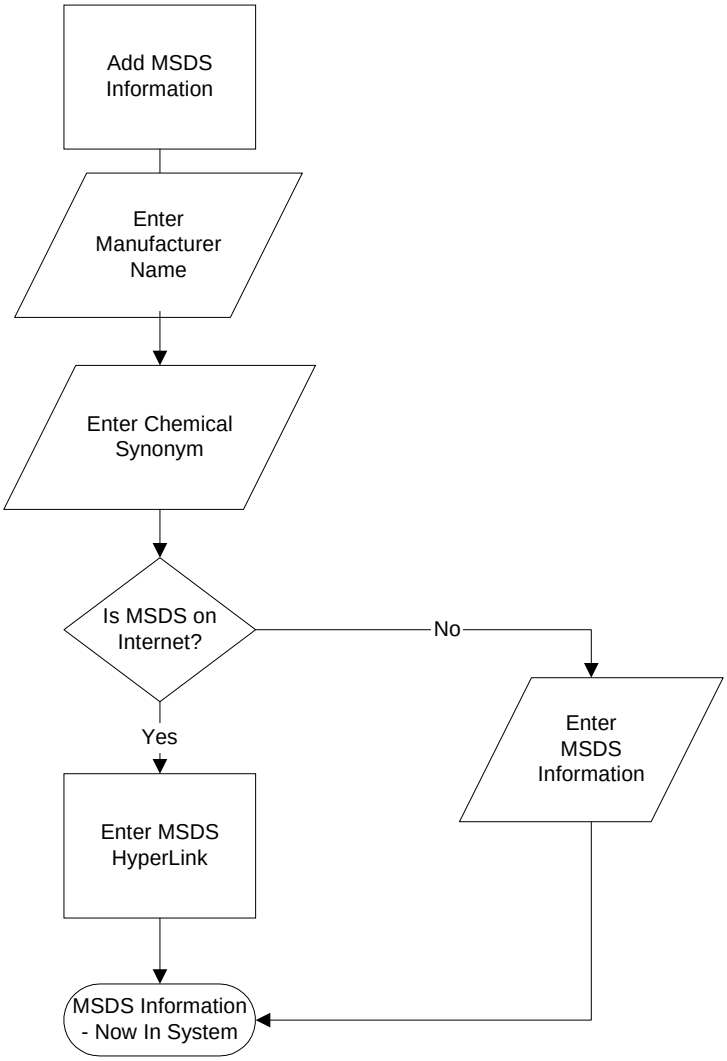
B.5 Transfer Container to Different Facility



B.6 Add New Recipe Container



B.7 Add Manufacturer/MSDS Information



B.8 Print Label